

REMARKS

In response to the Office Action dated September 3, 2009, claims 1, 7, 8, 10 and 15 have been amended and claims 6 and 9 have been cancelled. Claim 1 is the sole independent claim.

Adequate descriptive support for the present Amendment should be apparent throughout the originally filed disclosure as, for example, the depicted embodiments and related discussion thereof in the written description of the specification. Applicants submit that the present Amendment does not generate any new matter issue. Entry of the present Amendment is respectfully solicited. It is believed that this response places this case in condition for allowance. Hence, prompt favorable reconsideration of this case is solicited.

Claims 1-11 and 13-16 were rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement. The Examiner asserted that claims 1 and 15 recite an electron concentration of the first diamond semiconductor exhibits a negative correlation with temperature, in a temperature range having a width of 100° C or more and included within a temperature region from 0° C to 300° C. The Examiner concluded that this limitation is a property of the device and the disclosure does not support this limitation and does not enable one of ordinary skill in the art to make or use such an invention. Applicants respectfully traverse.

As defined in claim 1, a distortion or defect is artificially formed, and such artificially formed distortion or defect functions as a carrier trap in the claimed first diamond semiconductor. That is, even though the claimed diamond n-type semiconductor of independent claim 1 comprises only a first diamond semiconductor, the claimed properties can be realized by such artificially formed distortion or defect functioning as a carrier trap.

The Supreme Court set the standard for determining whether the specification meets the enablement requirement. That standard is whether undue experimentation is needed to practice

the invention. *Mineral Separation v. Hyde*, 242 U.S. 261, 270 (1916); *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404, (Fed. Cir. 1988); MPEP 2164.01. Applicant submits that in light of the instant disclosure, one of ordinary skill in this art would be able to practice the invention. There are many factors that must be considered when reaching a conclusion of lack of enablement. These factors include:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the

content of the disclosure. *Wands*, 858 F.2d at 737; 8 USPQ2d at 1404.

The Examiner's analysis of enablement must consider all the evidence related to each of these factors. Focusing on one or only several of the factors is not sufficient to determine whether an invention is not enabled. MPEP § 2164.01(a). There is no indication in the Office Action that the Examiner considered the all of the above factors in reaching the conclusion of lack of enablement. The rejection is not legally viable for at least this reason.

In order to make a rejection for lack of enablement, the Examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); MPEP § 2164.04. The Examiner must provide a reason as to why the scope of protection provided by a claim is not adequately enabled by the disclosure. A specification disclosure which contains a teaching of

the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be relied on for enabling support. *See In re Marzocchi*, 439 F.2d 220, 224, 169 USPQ 367, 370 (C.C.P.A. 1971); MPEP § 2164.04.

Specifically, as defined in claim 1, a distortion or defect is artificially formed, and such artificially formed distortion or defect functions as a carrier trap in the claimed first diamond semiconductor. That is, even though the claimed diamond n-type semiconductor of independent claim 1 comprises only a first diamond semiconductor, the claimed properties can be realized by such artificially formed distortion or defect functioning as a carrier trap. Applicants submit, therefore, that one of ordinary skill in this art would know how to make and use the invention of claim 1 in light of the instant disclosure. Applicants submit that claim 1 fully comports with the requirements of 35 U.S.C. § 112, first paragraph.

Claims 1-6, 8, 11 and 13 were rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Imai et al. (U.S. Pat. No. 5,001,452, hereinafter “Imai”), or in the alternative, under 35 U.S.C. § 103(a) as allegedly obvious over Imai. Applicants respectfully traverse the rejection.

Dependent claim 7 was rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Imai in view of Hasegawa et al. (U.S. Patent App. Pub. No. 2002/0127405). Applicants respectfully traverse.

Dependent claims 9, 14 and 15 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Imai in view of Yoshida (U.S. Pat. No. 6,340,393, hereinafter “Yoshida”). Applicants respectfully traverse.

Dependent claims 10 and 16 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Imai in view of Yoshida and further in view of Hasegawa. Applicants respectfully traverse.

Dependent claim 12 was rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Imai in view of Shiomi et al. (U.S. Pat. No. 5,252,849, hereinafter “Shiomi”). Applicants respectfully traverse.

By the above amendment, independent claim 1 is directed to:

A diamond n-type semiconductor comprising a first diamond semiconductor which has n-type conduction and in which a distortion or defect is artificially formed,

wherein said first diamond semiconductor contains at least one kind donor element of  $5 \times 10^{19} \text{ cm}^{-3}$  or more in total and an impurity element other than the donor element, the contained amount of the impurity element being lower than the total contained amount of the donor element, and

whereby said first diamond semiconductor has an n-type dopant concentration adjusted by vapor-phase growth such that an electron concentration of said first diamond semiconductor exhibits a negative correlation with temperature, in a temperature range having a width of 100°C or more and included within a temperature region from 0°C to 300°C a diamond n-type semiconductor and a manufacturing method thereof characterized by a diamond semiconductor which has a n-type conductivity and in which distortion is artificially formed.

Claim 1 now recites the feature of cancelled claims 6 and 9, as well as the relationship between the total contained amount of donor and the contained amount of impurity element other than the donor. Such a definition is a structure for artificially forming a distortion or defect into a diamond semiconductor and setting the diamond semiconductor for n-type conduction.

In order to control the formation of distortion or defect, the relationship between the total contained amount of donor and the contained amount of impurity element excluding the donor is defined in claim 1. See also paragraph [0020] of the present specification.

The claimed impurity element is, for example, silicon, and the lower limit of the contained amount of silicon is set to be lower than that of the total contained amount of donor. See for instance, claims 1 and 10.

Claim 1 describes that the contained amount of the impurity element is lower than the total contained amount of the donor element, in order to control the formation of distortion or

defect. In contrast, the Imai reference does not teach or remotely suggest doping an impurity for the purpose of suppressing a distortion or defect formed in a diamond semiconductor. Further both the Imai and Yoshida references do not teach or suggest the claimed relationship between the total contained amount of donor and the contained amount of impurity element excluding donor. The present claimed structure cannot be realized even if Imai, Hasegawa, Yoshida and Shiomi are combined as suggested by the Examiner. As such, the foregoing rejections are not legally viable and should be withdrawn.

Under Federal Circuit guidelines, a dependent claim is allowable if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Thus, as independent claim 1 is allowable for the reasons set forth above, it is respectfully submitted that dependent claims 2-5, 7-8 and 10-16 are allowable for at least the same reasons as the base claim.

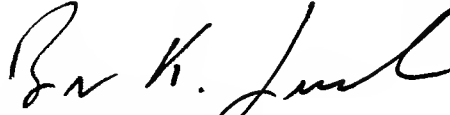
Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call the undersigned attorney at the telephone number shown below.

**Application No.: 10/580,346**

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



Brian K. Seidleck  
Registration No. 51,321

600 13<sup>th</sup> Street, N.W.  
Washington, DC 20005-3096  
Phone: 202.756.8000 BKS:idw  
Facsimile: 202.756.8087  
**Date: November 13, 2009**

**Please recognize our Customer No. 20277  
as our correspondence address.**